Decision Climate for Steam Efficiency: Update December 31, 2002

Carlo La Porta, Future-Tec

Abstract

The Performance Evaluation and Policy Subcommittee of the BestPractices Steam Steering Committee issues a periodic compilation of data that the Energy Information Administration, U.S. Department of Energy, reports in its Short-Term Energy Outlook. The author selected data relevant to industrial decision makers concerned with supply and price of energy purchased for industrial fuel. The ulterior purpose is to help frame decisions that will encourage more investment to improve the efficiency of industrial steam systems.

Data From U.S. Department of Energy Short-Term Energy Outlook

Weather Impacts

Despite an 11 percent increase in cooling degree days during summer 2002, high utility demand for fuel to make electricity did not create a spike in natural gas prices. Natural gas spot prices did, however, exceed $3.00 per thousand cubic feet in August and rose to $3.90 in November. Population-weighted heating degree days for October and November were 16 percent higher compared to normal in the Northeast United States and were eight percent higher than normal nationally. The winter after January is projected to be warmer than normal. A 12 percent colder winter of 2002-2003 will increase demand for heating oil, gas and electricity, and hold or pressure fuel prices upward and EIA has predicted that natural gas will be $1.50 more per 1,000 cubic feet than last winter.

Industrial Production

U.S. GDP is projected to be 2.3 percent higher in 2002 compared to 2001 and grow 2.6 percent in 2003. Manufacturing production fell in 2001 by 4.3 percent, was projected to fall another 0.4 percent in 2002, then rise 3.4 percent in 2003. U.S. business inventory dropped $36.2 billion ($1996) in 2001, and another $14.8 billion ($1996) is the projected drop for 2002. A gain of $6.7 billion is forecast for 2003.

Petroleum

The benchmark West Texas Intermediate oil spot price rose by $1.40 per barrel in August compared to July, averaging $28.40 per barrel (bbl) for the month. At that time OPEC was producing 1.8 million barrels per day over its quota and the October average price for OPEC oil was $27.60 per barrel. Iraqi production had fallen by 1.2 million barrels per day in August compared to August 2001. A political crisis in Venezuela cut its oil exports severely in December, which increased market uncertainty and put more upward pressure on oil prices. These conditions pushed oil prices above $30 per barrel by the end of 2002. The New York Mercantile Exchange price on December 31, 2002, for light sweet crude deliveries in February 2003 was $31.37/bbl. The February delivery price actually had dropped $1.35 per barrel based on news that an OPEC country had indicated OPEC production might increase to bring prices down. The EIA forecast has assumed that OPEC will increase production to keep the price in its desired range between $22-$28/bbl. Economists are concerned about continued slow recovery in U.S. economic growth and EIA has dropped its U.S. GDP growth rate projection from 4.1percent in 2003 to 3.0 percent. Still, EIA expects U.S. demand for petroleum products to rise 3.9 percent in 2003.

Table 1: World Oil Demand Growth (*italics signify forecast*)

Actual	Projected	
2001	*2002*	*2003*
0.0%	*0.4%*	*1.8%*

All data: U.S. DOE-EIA

In 2002, average daily U.S. oil production will have fallen one tenth of one percent (0.10 %) to 5.8 million barrels per day. In 2003 domestic production is projected to fall by 3.5percent to a level of 5.6 million barrels per day. With oil imports projected to average 10.5 million barrels per day in 2002, the U.S. will have depended on foreign oil for 64.4 percent of its supply.

Distillate Fuel Oil

Last winter, due to mild weather, the industrial downturn and expanded reliance on natural gas, distillate demand fell 230,000 barrels per day, or six percent, and inventories rose. By late November 2002, the distillate inventory fell below the minimum average amount for the last five years,

Table 2: Average Annual U.S. Energy Prices, EIA Base Case (Nominal Dollars per Barrel) (*italics signify forecast*)

	1999	2000	2001	*2002*	*2003*
Crude Oil Imported	$17.26	$27.72	$22.01	*$23.73*	*$23.94*
West Texas Inter. Spot	$19.25	$30.29	$25.95	*$25.93*	*$25.96*

All data: U.S. DOE-EIA

Table 3: Status of Distillate Oil Stocks Inventory, Late 2002

Stocks end of August 2002	130 million barrels
Stocks end of November 2002	120 million barrels (~ 18 milion barrels lower than January 2002)

due to the colder October and November. Tightened supply with predicted higher oil prices and recovering industrial demand should push the price for distillate up about 10 cents per gallon.

Natural Gas

In March 2002, EIA predicted that during summer 2002, natural gas wellhead spot prices per thousand cubic feet would fall below $2.00. Instead, the wellhead price averaged $2.83 in the third quarter and for all of 2002, the average will be close to $3.00 per thousand cubic feet. Spot prices hit $4.00 per thousand cubic feet in November, and rose significantly in December. January and February delivery prices on December 18th were $5.28 and $5.25 per million Btu. These higher prices should continue throughout the winter months. The winter delivery prices contrast with the average wellhead price EIA projects for all of 2003, which is $3.69 per thousand cubic feet. Overall demand for gas in 2003 is projected to rise 3.6 percent. Earlier in 2002, EIA projected industrial demand for natural gas to rise by 9.6 percent in 2002, and another 6.3 percent in 2003. Domestic dry gas production in 2002 should be 1.6 percent lower than 2001. EIA projects it to rebound by 2.7 percent in 2003 as demand rises and inventories fall to normal. Working natural gas in storage was 2.95 trillion cubic feet in November, nine percent below the level at the same time in 2001. Through 2003, natural gas in storage is predicted to be above the five year average until the end of the year, when it will drop below it.

Active rigs drilling for natural gas were 43 percent lower in August 2002 than 12 months previously.

Although no gas price spike ($9.00/MCF) is foreseen similar to the one that occurred in winter 2001, the EIA projection range plotted for 2003 now indicates that the base case wellhead price should be well over $4.00 per thousand cubic feet in early 2003, and the range shows that it could possibly reach a high of near $6.00 before falling

Table 4: Natural Gas Demand (trillion cubic feet) (*italics signify forecast*)

	2000	2001	*2002*	*2003*
Total U.S. Demand	23.44	22.41	*22.21*	*23.11*
Annual Industrial Demand	n.a.	9.00	*9.86*	*10.43*

All data: U.S. DOE-EIA

Table 5: Summary of Natural Gas Production, 2001-2002

	2001	2002
Average domestic production per month	1.62 trillion ft^3	1.59 trillion ft^3
Net imports per month	0.30 trillion ft^3	0.28 trillion ft^3

All data: U.S. DOE-EIA

Table 6: Coal Receipt Prices ($/short ton) at Selected Manufacturing North American Industry Classficiation System Category

	Apr-June 2001	Apr-June 2002	Change
Paper	$41.93	$43.88	+ 4.6%
Chemicals	$36.38	$40.02	+ 10.0%
Primary Metal*	$27.41	$28.19	+ 2.8%
Avg. All Industries	$31.89	$33.43	+ 4.8%
*Excludes coke [At 25 MMBtu per short ton bituminous coal $33.43 = $1.34/MMBtu]			

All data: U.S. DOE-EIA

as summer approaches. The lower boundary of the predicted range for 2003, is about $2.50 during the summer months. In other words, gas price uncertainty remains pretty high. The drilling rig count remains low, and the gas industry is finding that many wells dug from existing bore holes are delivering gas for a shorter period of time than historically. Some speculation about adequate gas supplies has begun to surface, but the gas industry appears confident that higher prices will ensure adequate supply.

Coal

In the March 2002 DOE Short-Term Energy Outlook, the only EIA statement regarding coal predicted a continuing slow price decline through 2003. The September report did not mention coal. Demand for coal is set by the utility sector, which consumes 87percent of U.S. coal production (56 percent of electricity is generated by coal plants). Total U.S. coal supply, net of imports and exports, was 1,090.4 million short tons in 2001 and was forecast to drop to 1,054.7 million short tons in 2002, and drop again in 2003, to 1,052.6 million short tons. Demand for coal was projected to rise 0.8 percent in 2002 and 1.1 percent in 2003.

Total industrial coal consumption for coke plants was 26.1 million short tons in 2001 and should decline to 23.5 million short tons in 2002. EIA expects coke plant consumption to recover somewhat to 24.3 million metric tons in 2003. Non-utility independent power producer demand for coal, excluding cogeneration, was 150.6 million short tons in 2001, and is forecast to grow to 192.7 million short tons in 2002 and 197.1 million short tons in 2003. Retail and general industry use, which was 67.5 million short tons in 2001, is forecast to drop slightly to 65.3 million short tons in 2002 and decline again in 2003 to 65.0 million short tons. Western low sulfur coal production is forecast to rise 2.5 percent per year through the next two decades while higher sulfur eastern coal production is projected to remain level. Contrary to EIA's expectation that coal prices will continue a decline, over the last 12 months, for all industries, they have actually risen 4.8 percent.

Restructuring of electric utilities is expected to keep pressure on coal producers and railroads to cut costs. The coal industry may further consolidate in response to a utility movement to negotiate shorter term contracts for coal. Coal producers may need to take steps to manage a higher level of risk and coal futures markets are being created in some regions. In short, restructuring in the electric power sector could have a spillover effect on the stable coal market.

Implications for Marketing Industrial Steam Efficiency

The U.S. electric power sector, which reached a record production high in August (source: Edison Electric Institute), demonstrated its flexibility to adjust to fuel price changes. In 2002, total oil-fired generation is expected to be 30 percent lower than in 2001, while natural gas use is projected to increase 7.2 percent compared to 2001. In the industrial sector, unlike utilities, natural gas dominates energy consumption. EIA 1998 data for all manufacturing industries show the following fuel consumption figures, in trillion Btu, in Table 7.

Environmental emissions associated with conventional coal combustion remain a brake on fuel switching, unless industry were to adopt coal gasification or best available technologies to control air pollution.

Table 7: U.S. Industrial Fuel Consumption (Trillion Btu), 1998

Natural Gas	LPG & NGL	Coal (excl. coke & breeze)	Residual Fuel Oil	Distillate Fuel Oil
6,644	135	1,143	357	133

All data: U.S. DOE-EIA

Industrial firms may be feeling somewhat secure about gas supply. The California utility "crisis" was partly created by trader manipulations and supply has met demand this year without strain. Furthermore, gas imports only account for 15 percent of U.S. demand, almost all of which comes from Canada, which increases confidence in domestic supply stability. It is not likely that industry is very aware of a debate now being conducted about the timing of global peak oil and gas production, and the impact that a two percent per year increase in natural gas use in the U.S. will have on supply if the peak in gas use occurs in 15 years rather than 35. The gas industry believes it will be able to deliver 30 trillion cubic feet per year, but there is more need to track trends at this time for decision makers.

Gas industry conditions in the U.S. have established a dynamic that promotes cyclical price movements. First, short-term supply and demand for gas is relatively inelastic. In periods of scarcity or abundance of supply, prices move a great deal. Second, gas producers experience large fluctuations in cash flows, investments and available supplies at the wellhead due to the large price movements. This perpetuates the situation. Third, the gas industry is likely to over-invest relative to gas demand when prices are high and under-invest when they are low. This is due to the significant amount of time between changes in price and changes in wellhead gas supply, typically 6 to 18 months. Finally, some gas producers are now experiencing more rapid dropoffs in production from new natural gas wells. If production declines faster than anticipated in these new wells, producers may get caught short if they have cut investment in developing new capacity. The near-term outlook for industrial users is to expect significant price fluctuations. It may be some time, if ever, before the market sees $2.00 per thousand cubic feet gas.

Government policy is also likely to have a larger impact on natural gas supply and therefore, demand. Estimated total undiscovered, technically recoverable natural gas resources off the coasts of the mainland U.S. are about 235 trillion cubic feet. Of this amount, about 60 trillion cubic feet are currently inaccessible due to policy. The Rocky Mountain resources currently on federal lands and inaccessible represents another 30 trillion cubic feet. A third factor will be imports of liquefied natural gas (LNG). They have been rising rapidly and in the future could rise and fall to mitigate price swings related to domestic supply. In short, there is more uncertainty about natural gas supply now than in recent years and industry decision makers should follow trends with more attention when making decisions about energy-related investments in their plants.

Congress adjourned in 2002 without passing national energy legislation. With the Republicans now holding both Houses, an energy bill should emerge in this session. The Bush administration has also adjusted New Source Review EPA regulations that may make it easier for companies to invest in equipment upgrades that will include more efficiency. It should be noted that the supply-oriented National Energy Strategy document the Bush administration produced had little to say about industrial efficiency, but the energy legislation could include financial incentives for energy conservation investments that will pertain to industry. The picture will not become clearer until Congress organizes and the FY2003 appropriations bills are finally passed. In the meantime, potential to promote steam efficiency to reduce NO_X emissions and enhance compliance with clean air requirements is growing stronger in certain areas of the U.S.

Near-term gas price is another matter and EIA has forecast a significant increase in gas prices in 2003 as the economy recovers and colder weather increases demand this winter. Prices will also be affected by the decline in U.S. gas production in 2002 and the inevitable link with current oil prices, which at the end of 2002 have gone over $30 per barrel. Will these higher prices stimulate investment in steam efficiency? Probably not. Company managers are contending with excess production capacity, lower sale prices for their products and serious erosion of their stock value. This economic environment is more likely to stimulate quick and easy cost cutting. Given a thinning of staff capabilities in many companies, energy conservation may have a hard time getting on the "quick and easy" cost cutting list. Indeed, training companies have indicated that companies are restricting travel, a sign that the general environment for increasing efficiency remains difficult. Conservation proponents might argue that low interest rates should justify borrowing to invest in energy saving projects that would lower bottom-line costs and repay the loans easily. Unfortunately cost cutting to retain profits on a smaller volume of sales probably will not stimulate allocation of internal capital for energy efficiency improvements.

Looking a little further ahead, an intervention in Iraq might disrupt oil supply for a short time, but Iraq's one to two million barrels per day of oil sales can easily be made up by OPEC. Iraq has very large oil reserves, so if the S. Hussein government is replaced, Iraqi oil sales could double in a short time and prices would then drop. If high gasoline prices triggered, as usual, consumer action to conserve energy, industry may respond for a short while by deciding to give more priority to energy investments. The likelihood that oil price rises would be short-lived suggests, however, that more stimulus to invest in steam efficiency will result in a true rebound from the downturn in the industrial sector.

References

1. U.S. Department of Energy, Energy Information Administration: *EIA Annual Energy Outlook 2002 with Projections to 2020.*
2. Web page: "Short Term Energy Outlook– March 2002" www.eia.doe.gov/emeu/steo/pub/contents.html.